

THE WEATHER AND HEALTH  
OF LONDON<sup>1</sup>

## II.

AN examination of the curve for the whole mortality (Fig. 4, NATURE, vol. xxii. p. 144) shows that the great preponderance of deaths in London takes place during the coldest months of the year. Of the diseases to which this excessive mortality is due, the first place must be assigned to diseases of the respiratory organs, the more marked of which are given in Figs. 12 to 15. About one in eight of all deaths that occur is caused by bronchitis, and one in sixteen by pneumonia; so that nearly one-fifth of the deaths is occasioned by these two diseases of the respiratory organs. Our researches appear to warrant the conclusion that the greatest fatality from these diseases occurs when the temperature is between 32° and 40°. In New York, when the winter temperature is 10° lower than in London, the mortality from bronchitis and pneumonia is greatly less; on the other hand, in Melbourne, where the winter temperature is about 10° higher than that of London, the mortality from diseases of the respiratory organs forms but a small fraction of the whole deaths.

These four curves of the mortality from diseases of the respiratory organs are substantially the same, each having its maximum in the cold months and its minimum in the warm months. Asthma shows, in the amplitude of its annual range, the greatest sensitiveness to weather, and pneumonia the least. They all show, though in different degrees, a double-ridged maximum: the one ridge being in the middle of January, when the temperature falls to the annual minimum, and the other in March, when the combined qualities of cold and dryness are at the annual maximum. Asthma and bronchitis are decidedly at the maximum when the weather is coldest, whereas laryngitis has its maximum in March, when the weather is coldest and driest, the last disease thus forming the link connecting the more strictly throat diseases with diseases of the nervous system.

But an element of weather other than mere temperature plays an important part in bringing about the high death-rate from these diseases. That deleterious atmospheric influence is fog; and in cases where the fog is dense and persistent the mortality from diseases of the respiratory organs becomes truly appalling, as happened in London early in 1880, when the mortality was nearly doubled. An examination of the fogs of London shows that they do not commence till the autumnal equinox; and it is at this epoch that asthma (Fig. 12), by far the most sensitive of all diseases to fog, starts from its annual minimum; and in the end of November and begin-

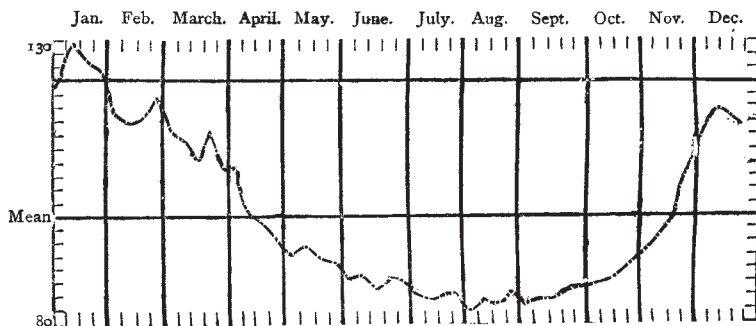


FIG. 12.—Asthma.

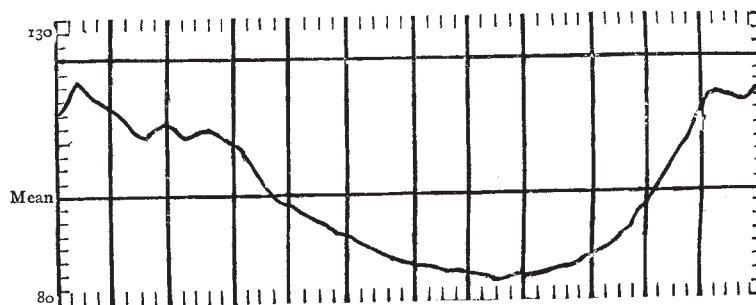


FIG. 13.—Bronchitis.

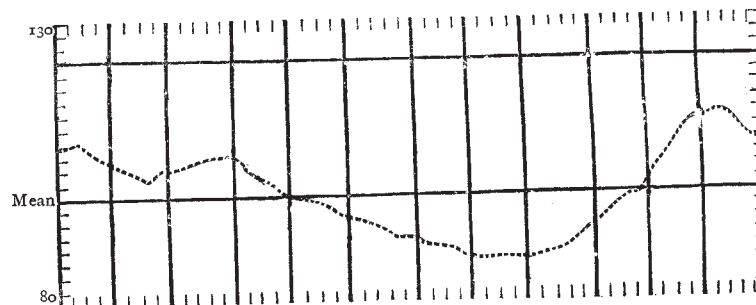


FIG. 14.—Pneumonia.

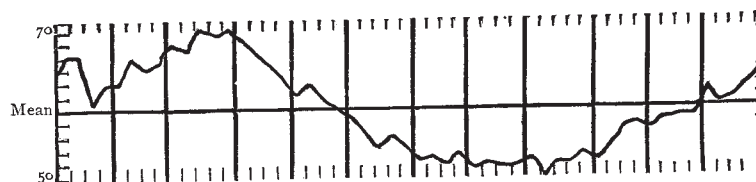


FIG. 15.—Laryngitis.

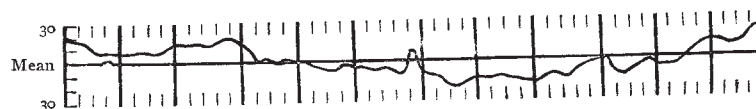


FIG. 16.—Apoplexy.

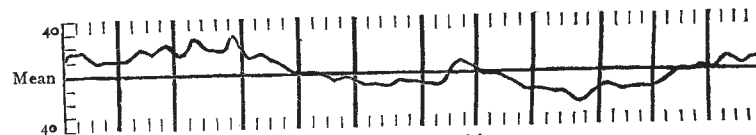


FIG. 17.—Convulsions.

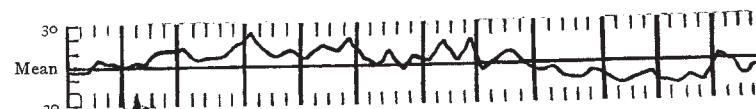


FIG. 18.—Cephalitis.

<sup>1</sup> Substance of a Lecture delivered at the Royal Institution, March 25. Continued from p. 146.

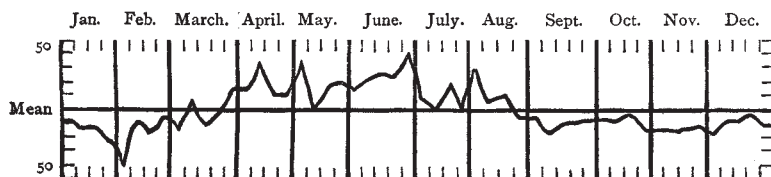


FIG. 19.—Suicides.

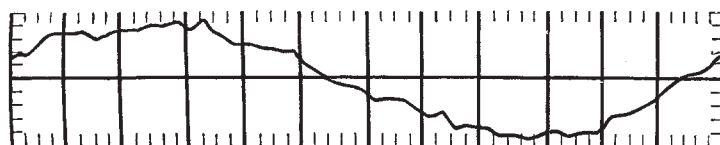


FIG. 20.—Whooping Cough.



FIG. 21.—Gout.



FIG. 22.—Phthisis.

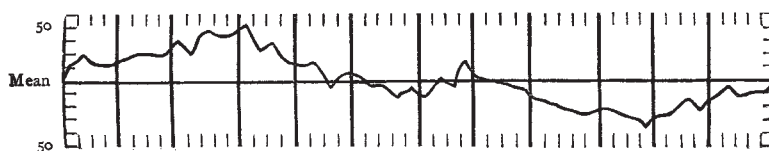


FIG. 23.—Teething.

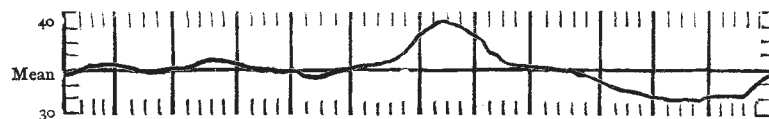


FIG. 24.—Convulsions (New York).

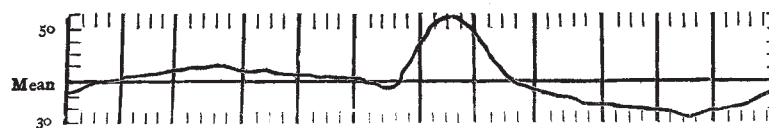


FIG. 25.—All Nervous Diseases (New York).

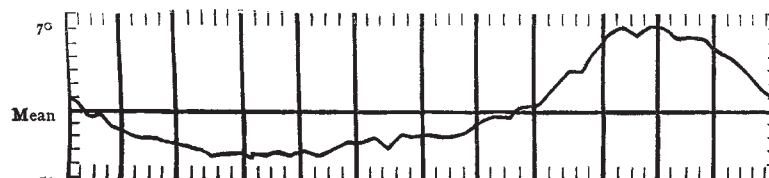


FIG. 26.—Scarlet Fever.



FIG. 27.—Typhoid Fever.

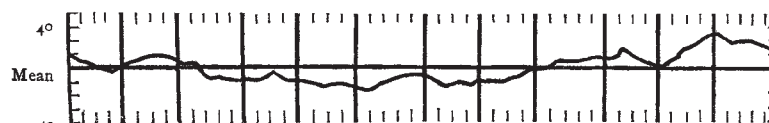


FIG. 28.—Diphtheria.

ning of December, when fogs become most frequent, the curves for asthma and bronchitis shoot up with startling suddenness.

Figs. 16, 17, and 18 represent the curves for three of the nervous diseases, viz. apoplexy, convulsions, and cephalitis. Apoplexy will be observed to show a double-ridged maximum quite analogous to that of the diseases of the respiratory organs; whereas, in the case of convulsions, the maximum may be regarded as quite single, and occurring in spring, this being the season when nervous diseases generally are most fatal. On the other hand, the curve for cephalitis stands alone among nervous diseases as having its annual maximum somewhat later, and keeping above the mean till at least the end of July, thus covering that portion of the year when the climate is driest and hottest, as well as driest and coldest. The intimate relations observed between the curve for suicides (Fig. 19) and that for cephalitis is very striking.

The maximum mortality for whooping-cough, Fig. 20, gout, Fig. 21, and phthisis, Fig. 22, occur in the same season as that for the nervous diseases. The maximum mortality from whooping-cough occurs in the spring months, and the curve suggests that this is more a disease of the nervous system than of the respiratory organs, a view which, singularly enough, was maintained by the elder Dr. Begbie, one of the most distinguished of our Edinburgh physicians, upwards of thirty years ago. The relations of gout to diseases of the nervous system are too obvious to call for remark. Phthisis is one of the two most fatal scourges of our British climate, one out of every eight deaths which occur being caused by consumption. Its mortality-curve, Fig. 22, shows unmistakably its intimate relations to nervous diseases, thus affixing greater significance to its known complications with hereditary insanity, scrofula, and some other mental diseases.

Reference has been made to the influence of the heat of summer on certain of the nervous diseases. That influence acts fatally, both indirectly through the bowels in the case of the young, and directly on the nervous centres. The curve for convulsions, Fig. 17, is identical with that for teething, Fig. 23, and it may be added that the curve for hydrocephalus is simply a reproduction of the same curves. Now these curves show a small, but distinct, and, as revealed by each year's figures, a constantly recurring secondary maximum in summer, which in the case of London is almost wholly due to the bowel complications of these diseases. The curve (Fig. 24) for convulsions for New York, where the summer temperature is  $10^{\circ}\cdot 0$  hotter than in London, shows this feature of the curve enormously magnified, so much so, indeed, that instead of being, as in London, an insignificant secondary maximum, it stands out as the prominent feature of

the curve. Whilst this result is doubtless largely due to complications with bowel complaints, it is, as an examination of the statistics shows, in no small degree caused by the direct influence of the great summer heat of New York on the nervous centres. This is impressively shown by the mortality curve for the whole of the nervous diseases (Fig. 25), which is even more pronounced in this particular than the curve for convulsions alone (Fig. 24). Keeping this fact in view, the peaks showing an increased fatality in London from cephalitis (Fig. 18) and suicides (Fig. 19) during July and August acquire, in the eyes of the physician, a more impressive significance.

The curve for the whole mortality (Fig. 4, NATURE, vol. xxiv. p. 144) shows September and October to be two of the healthiest months of the year. The three curves, scarlet fever (Fig. 26), typhoid (Fig. 27), and diphtheria (Fig. 28), are the most striking exceptions to this, these curves all indicating either a large increase in the death-rate or a high mortality during these months. While closely related to each other, each of these three

diseases has a distinct individuality of its own as regards the times of occurrence of the annual maxima and minima, and the varying amplitudes of their range from the mean line. It is a singular circumstance that diphtheria shows closer relations in its death-rate with typhoid than with scarlet fever.

Several other diseases suggest close alliances with each other through their seasonal death rates. Thus the curve for mortification is substantially that of nervous diseases, and the curves for erysipelas and puerperal fever are in all essential respects the same, a fact of singular suggestiveness to the family practitioner. The curve for old age is exactly parallel to that of paralysis, the old man's disease. The curves for skin diseases, rheumatism, dropsy, pericarditis, Bright's disease, and kidney disease exhibit most striking, and in many cases the closest alliances with each other. Lastly, while bowel complaints attain their greatest mortality when the temperature is highest, diseases of the respiratory organs when it is lowest, nervous diseases during the dry weather of spring and early summer, and

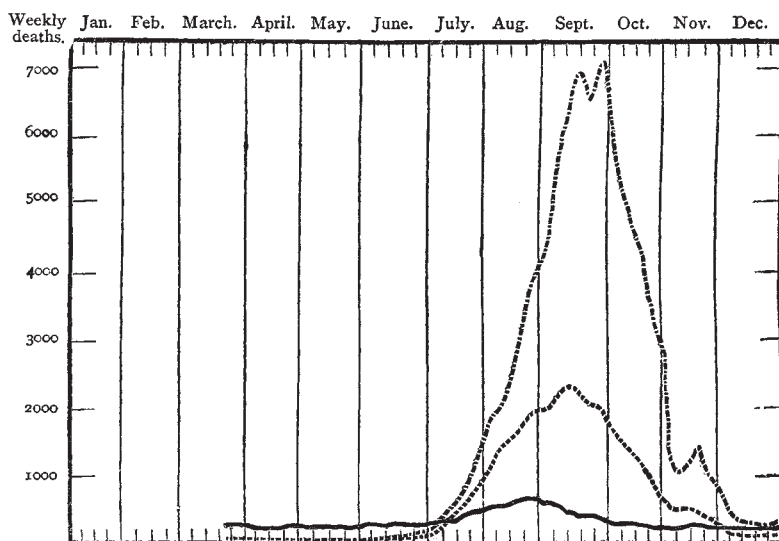


FIG. 29.—The Great Plague of London.

skin diseases and certain fevers during the raw weather of autumn and early winter, such diseases as ileus, that are quite removed from weather influences, exhibit curves which show no obedience whatever to season, but only a succession of sharp, irregular serratures resembling the teeth of a saw.

Atrophy and debility are most fatal to the very young in summer, but to the aged in winter; in the former case the complication being with bowel complaints, and in the latter with diseases of the respiratory organs. The annals of influenza show that a special character is given to this epidemic according to the season of the year in which it occurs. Thus when it occurs in spring the head and nervous system are most affected, but the bowels when the epidemic prevails in summer and autumn.

Fig. 29 shows by the doubly-dotted line, or highest curve, the weekly mortality of London during the Great Plague of 1665, the lower dotted curve the mean weekly mortality of the last six plagues, and the solid curve the mean weekly mortality from all other diseases during the continuance of the last six plagues. The manner in which the plague, as a death-producer, obeyed the weather is striking, and full of interest. It did so exactly in the way in which we have seen bowel complaints to be influenced by weather. The curve of mortality for the plague bears no resemblance whatever to that for typhus, or indeed any other disease except bowel complaints. The fact that

the progress of deaths from plague in relation to weather resembles so closely the corresponding progress of deaths from bowel complaints raises the question whether there may not be a closer alliance between them than has been suspected. If we are correct in regarding such a question as a fair outcome of this investigation of the relations of weather and health, it results that such investigations may occasionally point to a seat of morbid processes which have been cloaked by prominent phenomena, apparently of a primary, but in reality of a secondary character.

ALEXANDER BUCHAN

#### NOTES

THE death of Sir Josiah Mason on the 16th inst., at the advanced age of eighty-six, closes a remarkable career. Born at Kidderminster in humble circumstances, he began life as a street hawker of cakes, and after trial of shoemaking, baking, and a variety of other things in his native place, he went to Birmingham and found employment in the gilt toy trade. In 1824 he set up on his own account as a manufacturer of split-rings by machinery, and he afterwards added the manufacture of steel pens, of which he became really the largest producer, though less known than Gillott and Mitchell, owing to his pens being supplied by Messrs. Perry of London. He shares the credit of perfecting the modern steel pen, the history of which practically